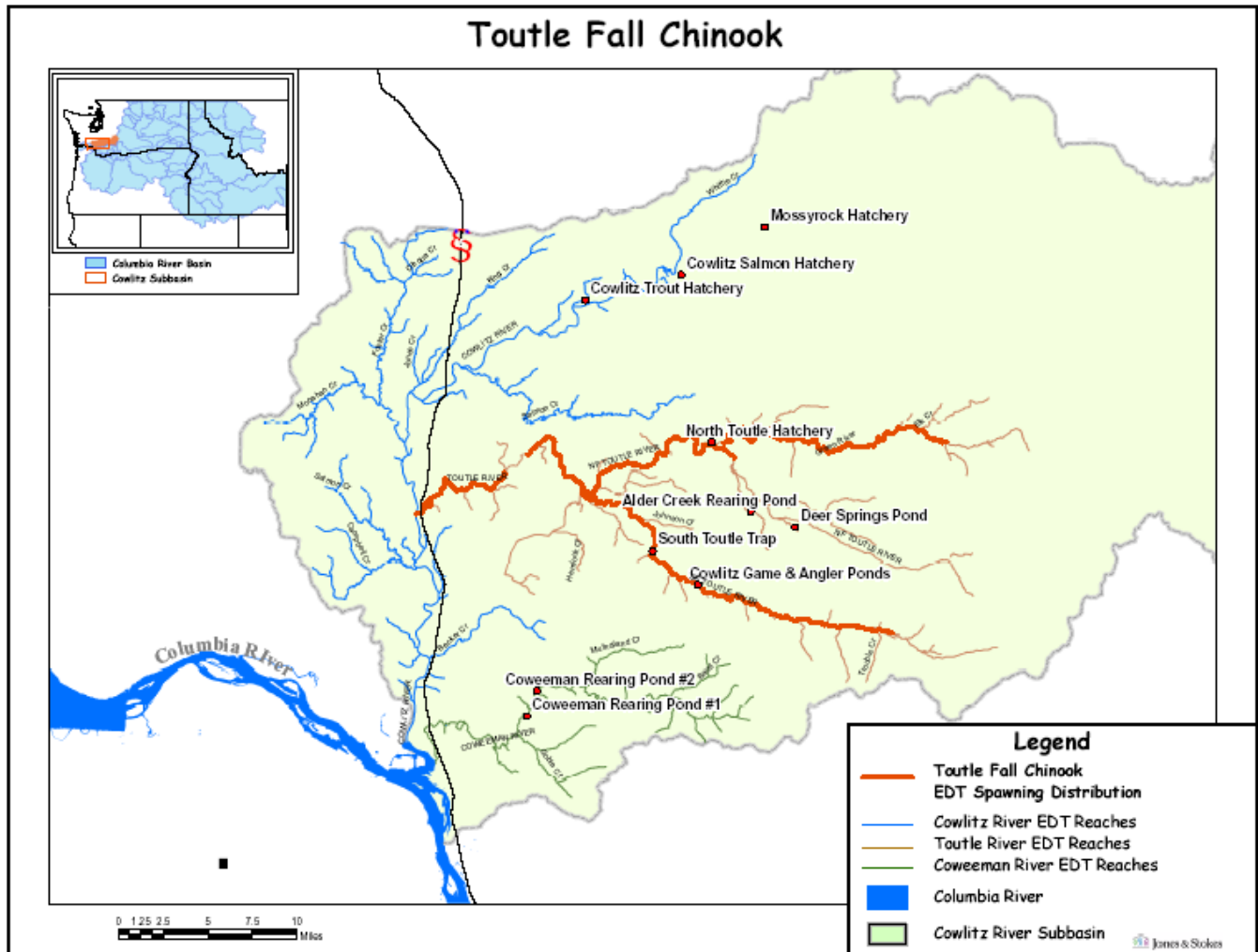


Hatchery Scientific Review Group Review and Recommendations

Cowlitz - Toutle Fall Chinook Population and Related Hatchery Programs

January 31, 2009



1 Cowlitz (Toutle) Fall Chinook

About 20 miles of spawning and rearing area are available above the hatchery trap on the Green River (excluding tributaries) (WDF 1973). Natural spawners (hatchery and natural-origin) from 1964 through 1979 averaged 42 percent (equal to 4,517 fish) of the Toutle subbasin spawners, which were estimated at 10,756 fish (Kreitman 1981 as cited in WDW 1990). The spawning grounds were destroyed by the 1980 eruption of Mt. St. Helens. The Toutle River Hatchery, located 0.5 miles up the Green River, began collecting broodstock again in 1990. Surplus hatchery fish were released upstream of the hatchery to spawn naturally. Broodstock has been from a mixture of sources since the 1980 eruption (WDW 1990). The estimated annual escapement of fall chinook in the Toutle and its tributaries in the early 1950s was 6,500.

An estimated 80 percent of the total Toutle fall Chinook run spawned in the lower five miles of the mainstem Toutle (WDF 1951). Annual surveys show the greatest abundance of adult fall Chinook on the North Fork Toutle River to be in a five-mile stretch from the Toutle River Hatchery (0.5 miles up the Green River) to Kid Valley Park on the North Fork Toutle. An average spawning escapement of 2,700 fall Chinook was observed from 1968 to 1972, with a sharp increase beginning in 1971. Fall Chinook were observed as far upstream as Spirit Lake (WDF 1973). An average of 10,756 adults returned each year to the Toutle River basin from 1964 through 1979 (pre-eruption). Of these, natural spawners of both hatchery and natural-origin in the Toutle subbasin averaged 6,573 fish from 1964 through 1979 with the following distribution: 4.8% from the mainstem, 3.8% South Fork Toutle, 49.4% North Fork Toutle, and 42% Green River (Kreitman 1981 as cited in WDW 1990). Spawning areas in the mainstem Toutle and North Fork rivers, as well as the Green River, were destroyed by the 1980 eruption of Mt. St. Helens (WDW 1990). DeVore (1987) assumed that 12.8% of the Toutle River fall Chinook spawned naturally and estimated that an average of 1,528 naturally-spawning fall Chinook entered the Toutle subbasin (HGMP 2004).

2 Current Conditions

2.1 Current Population Status and Goals

- **ESA Status:** This population is listed as threatened and is part of the Lower Columbia Chinook ESU.
- **Population Description:** This stock is one of 23 fall Chinook stocks in the ESU and is designated as a Stabilizing population (LCSR&SP 2004). Historically, this was a large tule fall Chinook population. There is significant history of hatchery transfers from other lower Columbia subbasins. The primary historical spawning areas of the North Fork and mainstem Toutle remain impacted by the eruption of Mt. St. Helens.
- **Current Viability Rating:** Low, with a goal to maintain a Low rating.
- **Recovery Goal for Abundance:** 1,000 naturally spawning fish.
- **Productivity Improvement Expectation:** Unknown.
- **Habitat Productivity and Capacity (from EDT):** Productivity 3.10; Capacity 6,748.

2.2 Current Hatchery Programs Affecting this Population

The North Fork Toutle Salmon Hatchery currently releases approximately 2,500,000 fingerlings. Approximately 1,120 broodstock are needed to support the program. Broodstock collection, adult

holding, incubation and rearing all occurs on-station. The program is described as an integrated harvest program. Some natural-origin fish may be inadvertently collected for broodstock, but the level is probably insignificant since most natural spawning is of hatchery-origin fish.

The marking/tagging level of the hatchery release does not allow the identification of natural-origin fish in the broodstock, as only 90,000 juveniles are adipose-clipped and coded-wire tagged.

Hatchery operations include:

- Using pooled gametes from 5 males and 5 females for mating protocols
- Incorporating jacks into the broodstock at a rate of approximately 2%
- Using a rearing flow index of approximately 1.6, higher than recommended

Overall survival averaged 0.15% for brood years 1995 – 1998. Total fishery contribution averaged approximately 3,750 fish per year for these brood year releases. Hatchery returns are projected to exceed broodstock needs by approximately 900 fish annually.

The current estimate of the proportion of hatchery-origin spawners (pHOS) in the total spawning population is 33%. The estimated adjusted productivity (with harvest and fitness factor effects) is estimated to be 0.77. The projected average natural-origin escapement is 570 fish annually. The projected annual harvest contribution is 2,900 fish. Hatchery returns are projected to exceed broodstock needs by approximately 900 fish annually.

Estimated number of hatchery strays affecting this population:

- Hatchery strays from in-basin integrated hatchery program:NA
- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 370 fish

3 HSRG Review

The HSRG has developed guidelines for minimal conditions that must be met for each type of program as a function of the biological significance of the natural populations they affect. For populations of the highest biological significance, referred to as Primary, the proportion of effective hatchery-origin spawners (pHOS) should be less than 5% of the naturally spawning population, unless the hatchery population is integrated with the natural population. For integrated populations the proportion of natural-origin adults in the broodstock should exceed pHOS by at least a factor of two, corresponding to a proportionate natural influence (PNI) value of 0.67 or greater. For Contributing populations, the corresponding guidelines are: pHOS less than 10% or PNI greater than 0.5. It is important to note that these represent minimal conditions, not targets. For example, the potential for fitness loss when effective pHOS is 5% is significantly greater than it would be at 3%. For Stabilizing populations we assume the current pHOS or PNI would be maintained.

The HSRG analyzed the current condition and a range of hatchery management options for this population, including the effect of removing all hatchery influence, and arrived at one or more proposed solutions intended to address the manager's goals, consistent with the HSRG guidelines for Primary, Contributing, and Stabilizing populations. The solution included in the cumulative analysis is the last option described in the Observations and Recommendations box below.

In order to highlight the importance of the environmental context, two habitat scenarios were considered: current conditions and a hypothetical 10% habitat quality improvement.

See HSRG Observations and Recommendations in the box below for more information.

3.1 Effect on Population of Removing Hatchery

The No Hatchery scenario is intended to look at the potential of the natural population absent all hatchery effects with projected improved fish passage survival in the Snake and Columbia mainstem (FCRPS Biological Opinion May 5, 2008).

Our analysis estimated adjusted productivity (with harvest and fitness factor effects from AHA) would increase from 0.8 to 1.5. Average abundance of natural-origin spawners (NOS) would increase from 510 to 1,253. Harvest contribution of the natural and hatchery populations would go from 2,892 to 1,257.

3.2 HSRG Observations/Recommendations

In the Observations and Recommendations box below, we describe elements of the current situation (Observations) that were important to evaluate the natural population, and where applicable, the hatchery program(s) affecting that population. We also describe a solution (Recommendations) that appeared to be consistent with manager's goals. However, this is not the only solution. In some cases more than one solution is described.

Summary results of this analysis are presented in Table 1. The adjusted productivity values reported for each alternative incorporates all factors affecting productivity (i.e., habitat quality, hatchery fitness effects, and harvest rates).

Observations

The Toutle Chinook are designated a Stabilizing population. Historically, this was an important fall Chinook population with significant remaining habitat productivity and abundance.

The Cowlitz (Toutle) fall Chinook population appears to be able to reach its conservation goal under numerous scenarios. With implementation of selective harvest regimes, the composite natural/hatchery population can make a significant contribution to harvest and still provide substantial conservation benefits, even though much of the historic spawning area for this stock is still significantly affected by the eruption of Mt. St. Helens.

The challenge to achieving conservation standards is collecting natural-origin broodstock for an integrated hatchery program.

Recommendations

Managers should consider designating this as a Primary population, given its available habitat. An integrated harvest program releasing 1.7 million fish (pNOB 25%) could be operated consistent with a Primary population designation.

Develop the capability to meet the challenge of collecting natural-origin broodstock that is representative of the entire population. This includes a monitoring program to estimate composition on the spawning grounds.

The HSRG recommends that managers implement a BKD control strategy for their spring and summer/fall Chinook hatchery programs where BKD has proved a recurring problem. Ideally, the strategy should include culling (destroying) eggs/progeny from hatchery- and natural-origin brood that are found to be infected with the BKD agent. However, because brood fish with high levels of the BKD agent are more likely to transmit the agent to their progeny than brood with lesser levels of the agent, the culling of eggs/progeny from infected brood fish, should, at the very least, be applied to those with high levels of the BKD agent (e.g., ELISA OD value of 0.4 and above when broodstock are not in short supply and ELISA OD value of 0.6 and above when broodstock are in short supply). In addition, in programs using ESA-listed natural-origin brood fish, the culling of their eggs/progeny may, at the managers' discretion, be dispensed with.

However, the ESA-listed broodstock should be injected, pre-spawning, with an appropriate antibiotic (preferably, azithromycin at 40 mg/kg fish), and the resulting eggs should be surface-disinfected with an iodophor. All pre-spawning brood injections may be limited to females, ESA-listed or otherwise.

Finally, eggs and hatchlings derived from broodstock found to be heavily infected with the BKD agent should be incubated/reared in isolation from those obtained from broodstock with no or lesser levels of the BKD agent. In addition, the hatchlings should be reared at the lowest possible densities (below current standards), and, at the first signs of infection with the BKD agent, they should be treated with orally administered erythromycin (100 mg/kg fish) for 28 days. The treatment should be repeated if there is evidence that the BKD agent has persisted in the hatchlings.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Toutle Fall Chinook. The light green row indicates the natural population and yellow indicates the segregated hatchery population, if applicable. A 10% habitat improvement is applied to the HSRG Solution to evaluate the additional effect of improved habitat towards conservation objectives.

Alternative	Type and Purpose	Prog Size (/1000)	HOR Recapture	Additional Weir Efficiency	Effective pHOS	PNI	NOS Esc	Adj Prod	Harvest	Hatchery Surplus
Current	None None	-	0%	0%	37%	0.00	510	0.8	512	0
	Seg Harv	2,500.4	85%						2,380	898
No Hatchery	None None	-	0%	0%	0%	1.00	1,253	1.5	1,257	-
HSRG Solution	Int Harv	1,561.4	85%	0%	10%	0.71	1,713	1.8	2,500	638
	Seg None	-	0%						-	-
HSRG Solution w/ Improved Habitat	None None	1,561.4	85%	0%	8%	0.00	2,433	2.1	2,842	638
	Seg Harv	-	0%						-	-